An Essay

on

The Secretory System

Respectfully Submitted

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by

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Secretory System

Among the various themes presented by the human system for contemplation, the one chosen may, perhaps, be regarded of paramount importance & wholly indispensable to the proper and healthy exercise of the bodily functions. The blood, the life giving blood, as it courses through its appropriate channels, penetrating the most delicate fibre, and reaching the farthest extremity, could not, though propelled by the constant & regular pulsations of the heart, serve its purpose, without, in part, receiving its purification from the Organs of Secretion. Every breath drawn, every motion made without pain, depends upon their healthy action. Aside from the consideration of those secretions

peculiar to serous, synovial and other membranes, all of which are Essential to ease & facility of motion, we purpose to confine ourself, chiefly, to those connected with and influencing digestion. It were a needless expense of time & patience, to enter upon a minute description of the structure of all the secretive glands pervading the alimentary canal; it may be observed, generally, that they contain an artery, vein, nerve & duct covered by a sack and are imbedded in the mucous membrane. In shape they differ. Some being flattened like the salivary, others elongated or tubal like those of the stomach, & perhaps the intestines. The salivary glands situated

in the mouth, furnish the fluid by which the food is moistened during masticationg, & prepared for reception into the Stomach. The constituents of this fluid appear to be analogous to those of the secretions of the Stomach, for it has been found that food moistened with water and merged in gastric juice, would but partially dissolve; but when saturated with saliva, became soluble in a very few moments; proving conclusively, that its peculair properties afford assistance to the secretions of the Stomach in their actions upon the food. The analyzation of the saliva is recorded in the books, as also, that of the secretion of the Stomach. I shall not insert

them here, but desire only to note the fact, that Saliva differs from water in its action upon food, seeming to possess properties Essential to the complete solution of alimentary substances, after they have reached the Stomach. We are shown, then, at the very outset of our subject, an indispensable provision, without which, articles of nutrition could not properly be prepared for changes subsequently to be wrought upon them. Nothing more is requisite for the production of this Secretion, than, Simply, contact with the glands; for the moment food is introduced into the mouth, Saliva is poured forth in abundance; nor is this indeed

necessary for the thought of food conveyed by the nerves from the brains to the nervous centres, is reflected upon the palate and immediately excites an abundant flow. If substances taken into the mouth are dry a much larger quantity of Saliva is required.

I come now to notice some of the diseases affecting the Salivary glands. Those which may more properly belong to the care of the Surgeon, I shall pass, and only touch upon functional derangement.

1st. There may be increased Secretion. Ptyalism or Salivation, which may be defined to be a morbid flow of Saliva discharged from the mouth by Expectoration.

There may be danger, sometimes, of mistaking this secretion for that which comes from the Stomach. The latter, however, is usually produced by eructation. Irritation is undoubtedly an Exciting cause of unusual Secretions of Saliva. The use of tobacco tends to produce it; oftentimes, as we know, much to the disturbance of health. So, also, an overdose of calomel: a nauseated Stomach; & I have witnessed one instance in which pregnancy caused an immoderate flow of Saliva, coming on about two weeks previous to the birth of the child. We know, likewise, that Hydrophobia, Scurvy & Hysteria excites it. In the latter I have seen it flow almost constantly.

There may likewise be deficiency of Secretion; when there will occur dryness of the mouth. Such will be the case in low fevers - & it is considered favorable when a return of Saliva occurs; - Changes in the character of the Saliva may take place; it may become so acid as seriously to affect the teeth - producing a disagreeable odor & rendering it most unpleasant to be near a patient. Inflamation may arise by which the Parotid Gland may be affected; the disease is then termed Parotitis -

Secretions of the Stomach.

The food passes into the Stomach by a succession of balls (bolus) & becomes

subject to the influence of another secretion peculiar to that Organ, viz, the Gastric Juice. The Stomach performs two very important offices. One is, the production of this fluid, and the other, its thorough admixture with the food by peristaltic motion. The glands which secrete the Gastric Juice are imbedded in the mucous membrane of the Stomach, & contain cells from which it is elaborated. Within these cells granules arise forming nuclei which are developed into cells, by the bursting of which the fluid Escapes and flowing down the walls of the Stomach soaks into the food. It is necessary that the Stomach be well filled but not distended to Excite the proper

action of the Secretion; so that the substances to be acted upon, may be in contact with every part of it. When the Stomach is empty, very little if any Secretion is Effected. Some of the glands of the Stomach seem only to serve a temporary purpose; for after having discharged their contents, they disappear. When food is first introduced into the Stomach it becomes turgid and its muscular coating contracts by which it grasps the food, so to speak, & the close contact of its contents excites the Secretion which mixes with them as before mentioned. Another interesting fact is, the closing up of the cardiac & pylorie orifices during digestion; so that

nothing can escape until complete Solution takes place. Whether Each gland emits precisely the same properties of Secretion, is an interesting question, & ought as yet decided; probably, they do not; & the fact that Some disappears, as above mentioned, might be adduced as Evidence of difference in character. The great power residing in the Gastric Juice is evinced in its softening and reducing to a pulpy mass the Substances upon which it acts. These Substances so reduced are termed Chyme. Its power of trituration is no doubt owing to its intense acidity. It also contains animal matter which seems to be necessary to perfect

the process of digestion, and is denominated Pepsin. A certain degree of temperature, about 100°, is also requisite, as has been proved by experiment. A complete digestion, then, demands the following conditions; viz, temperature of 100°, peristaltic motion, continual removal of digested portions of the food, to be succeeded by other portions, so that it may be subjected to the action of a fresh supply of the juice. It would occupy too much space here to enter upon a description of the numerous Diseases of the Stomach, I shall content myself with barely naming them. We have them acute & chronic Gastritis; said usually to be seated in the mucous

membrane. Gastorrhea, copious discharge of fluid; Cancer; Irritation; from congestion of the portal veins, from gastric contents; from gout & rheumatism; from Spinal affection & from Sympathy. These may be considered among the causes: The following are treated of as Separate diseases. Cardialgia; Gastralgia; Gastronidia; Pyrosis or waterbrash; Spasm of the Stomach; nausea & Vomiting; Sea Sickness; Sick Headache; morbid Appetite; depraved appetite; & last though not least, Dyspepsia. These are the names assigned but of course all result from the above mentioned causes.

The chyme passes through the

Pylorie Orifice into the Duodenum,
where it receives the action of another
fluid, generated in a neighboring
viscus denominated, the Liver.

The Liver is situated in the right
hypochondriac region extending
across the Epigastrium, is about
twelve inches in length, seven or eight
in breadth & weighs 3 pr or 4 lbs..
It is a conglomerate gland being
composed of thousands of minute
lobes each a distinct gland elabo-
-rating perhaps the most important
secretion in the Economy. This
secretion is termed Bile. "The bile
is a somewhat viscid fluid of a
greenish yellow color strongly bitter
taste and has a peculiar nau-

sous smell". While the Liver is a highly secretive organ, it also may be regarded as an Emunctory. for in hot climates and in foetal life, it performs offices vicarious for the lungs: it also removes noxious substances from the blood. The properties of bile do not exist in the blood in a separate state; it is elaborated from it through the agency of cells, containing nuclei, which when developed burst & yield their contents, which is bile. The formation of bile is very much accelerated, while food is being received into the stomach, and during digestion. Its secretion however is constantly going on; but

very slowly during fasting. Experiment has verified this. The cause of the increase of bile as above spoken of is supposed to be a greater activity in the circulation & this is remarked in all the secretive organs, in which, there is always to be observed a greater vascularity when there is an abundant flow of secretion, & vice versa. The bile having been elaborated in the hepatic cells runs out into small ducts which converging form a main duct through which it is discharged into the duodenum. The gall bladder acting as a reservoir, receives the bile that accumulates during fasting. Here is another wise and beautiful provision. We have seen that the generation of bile

is continuous, & this precise arrangement ensures its employment for its appropriate End, viz. digestion, though the latter takes place only at stated periods. were it not for this provision, much disturbance would probably arise from an engaged state of the liver: Besides its agency in the preparation of Chyme for absorption, after it reaches the duodenum, the bile also exercises the office of the purification of the blood. This is effected by excretion. The bile is engaged in the formation of Carbon & Hydrogen which passes from the blood in the form of Carbonic acid & Water a very large portion of Carbon & Hydrogen having been found

by analysis to exist in bile: the bile must therefor be reabsorbed from the intestines especially as none is found in excrementitious matter: or but a very minute portion. Bile is supposed also to be connected with the generation of heat by the combination of the carbon & hydrogen with oxygen before final ejection.

Though thus evidently serving the above purposes, viz, purification by excretion & digestion, the nature of its influence on the latter is but imperfectly known. Chyle is however imperfectly formed without its assistance as proved by experiment; for after tying the bile duct, although the secretion of the Stomach was not arrested and chyme was still discharged into

the duodenum upon an Examination of the lacteals the substance they contained was thin and transparent, instead of white and opaque, as is usually the case after partaking of food. Food is prepented from decomposition in the intestines by the peculiar properties of bile. It is supposed also to have a Stimulating Effect upon the intestines and to aid in the propulsion of their contents, for diarrhea will follow an excessive secretion of bile, whereas a deficiency will be followed by constipations occasioning the disease termed Jaundice. That chyme undergoes changes in its constituent properties within the intestines is evidenced by the fact that being in itself acid it becomes al-

kaline. This change is thought to be effected by the agency of the pancreatic fluid mingled with other secretions of the intestines. The addition or assumption of this alkaline property, reduces to a more minute separation, the fatty and oleaginous matter upon which it acts, and thus fitting more properly the materials of nutrition within the intestinal tube, for absorption by the lacteals.—

It only remains for me to notice the secretions of the Kidneys which have a special & peculiar formation and perform the office of separation rather than elaboration of the peculiar fluid secreted by them, which is termed Urine.

Secreting tubes denominated Tubuli

Uriniferi exist in each kidney in which the secretion commences, from whence it passes to the pelvis, from thence by the ureters to the bladder.

This separation of urine from blood is probably effected by the agency of gland cells similar to those of the Liver. Some of its constituents viz. Urea & Uric acid pre exist in the blood as they have been detected in it — other properties, as the salts, such as the phosphates & sulphates are supposed to be elaborated by cells —

This peculiar secretion seems to have been provided for the removal of the Urea from the blood as pernicious consequences ensue from its presence there. — An excess of animal food

will greatly increase the quantity of Urea — About thirty five ounces of urine is passed in twenty four hours.

The sufferings experienced by derangements of this secretion, would appear to be almost insupportable: perhaps no more excruciating pain is felt than when calculi pass into the Ureters from the kidneys, & when concretions block up the passages to the bladder.

The secretions of the mammæ, Skin, & testes, though affording much interest to the Student, I shall pass by, having already exceeded the limits prescribed to myself, in the commencement of this disquisition; and no doubt the patience of the reader is already Exhausted ——

In conclusion, I would say, that in the preparation of this Thesis, I claim no originality, no elegance of diction or sublimity of thought: I have neither soared on fancy's silver pinion to pluck flowers from the regions of imagination, nor have I drawn from the rich treasures of classic lore, wherewith to Embellish or enrich it — My only aim has been, to comply with a requisition of the College.

Should the Physician in future years, return to his Alma Mater and search its Archives for this record of medical attainment, would he find it engraved upon tablets of marble; or, transcribed upon gilded parchment, decorating its walls?

would it not rather be found oc-
cupying some dusty Pidgeon hole,
the winding Sheet of many a dead
fly? —